

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claim 1 (Currently Amended) A map generation device, comprising:

an image appointment unit that receives user appointment of at least one position in a building existing within an aerial photograph to designate the at least one position as part of a building region;

a polygon extraction unit that extracts at least one pixel from pixels within the building region based on a result of discriminating a color of the pixels around the building region to compare whether the pixels are within a gray-level variance of a predetermined discrimination threshold, sets the building region to include extracted pixels as a portion of an extracted building region, and repeats the extract and set operations to expand the extracted building region with more extracted pixels, and then extracts a polygon line of the extracted building region;

and

a vector generation unit that generates a vector of the polygon line of the extracted building region; and

a structural analysis and integration unit that detect a boundary of the building region and lines inside the building region, and compares between a shape of detected lines and a predetermined shape pattern of cross lines;

wherein the structural analysis and integration unit estimates the building region based on the compared shape of the detected lines in a case where the lines inside the building region correspond to any predetermined integration patterns, and

terminates a process for integrating the building structure in a case where there exist no lines corresponding to any of the integration patterns, and
wherein the vector generation unit generates a vector of the polygon line of the extracted building region estimated by the structural analysis and integration unit.

Claim 2 (Previously Presented) The map generation device according to claim 1, comprising a roof texture analysis unit that analyzes colors around the at least one position to determine sample colors for discriminating, the discrimination threshold, and a region searching range,

wherein the polygon extraction unit extracts at least one of the pixels to be included in the building region based on a result of discriminating a similarity between a color of the pixels in the region searching range and the sample colors for discriminating.

Claim 3 (Previously Presented) The map generation device according to claim 2, wherein the roof texture analysis unit extracts a plurality of pixels from a predetermined region including the at least one position, and determines the sample colors for discriminating, the discrimination threshold, and the region searching range based on a result of statistically analyzing colors of the plurality of pixels.

Claim 4 (Previously Presented) The map generation device according to claim 3, wherein the roof texture analysis unit expands the region of the discrimination threshold and reduces the region searching range when a variance is

large in the colors of the plurality of pixels extracted from the predetermined region including the at least one position.

Claim 5 (Previously Presented) The map generation device according to claim 1, wherein the polygon extraction unit extracts pixels largely different in color from adjacent pixels as edge pixels, determines boundary lines based on the edge pixels, and expands the extracted building region to the boundary lines to correct the extracted building region.

Claim 6 (Previously Presented) The map generation device according to claim 1, wherein the polygon extraction unit rotates the extracted building region so as to set the polygon line of the extracted building region in a predetermined axis direction, and smoothes the polygon line.

Claim 7 (Previously Presented) The map generation device according to claim 1, comprising a polygon correction unit that, in a case where the polygon line extracted by the polygon extraction unit corresponds to a predetermined linking pattern, corrects the polygon line to one of a straight line and lines crossing each other at a predetermined angle.

Claim 8 (Currently Amended) The map generation device according to claim 1, ~~comprising a~~ wherein the structural analysis and integration unit, ~~that,~~ in a case where a line of a building roof corresponds to a predetermined integration pattern, integrates the extracted building region so as to include the line.

Claim 9 (Previously Presented) The map generation device according to claim 8, wherein the structural analysis and integration unit integrates the building region at least once by a plurality of inputted positions.

Claim 10 (Previously Presented) The map generation device according to claim 1, comprising a ground projection unit that, in a case where the aerial photograph shows a building obliquely, corrects distortion due to a height of the building, and projects a building polygon shape on a ground.

Claim 11 (Previously Presented) A map delivery method, which is used to deliver a map by associating the map created by the map generation device according to claim 1 with the aerial photograph.

Claim 12 (Currently Amended) A computer program embodied in a computer-readable media to execute a map generation method, the method comprising:

receiving user appointment of at least one position in a building existing within an aerial photograph, to designate the at least one position as part of a building region;

extracting at least one pixel from pixels within the building region based on a result of discriminating a color of the pixels around the building region to compare whether the pixels are within a gray-level variance of a predetermined discrimination threshold, setting the building region to include extracted pixels as a portion of an extracted building region, and repeating the extracting and setting operations to

expand the extracted building region with more extracted pixels, and then extracting

a polygon line of the extracted building region; ~~and~~

generating a vector of the polygon line of the extracted building region; and

using a structural analysis and integration unit to detect a boundary of the building region and lines inside the building region, and to compare between a shape of detected lines and a predetermined shape pattern of cross lines;

wherein the structural analysis and integration unit estimates the building region based on the compared shape of the detected lines in a case where the lines inside the building region correspond to any predetermined integration patterns, and terminates a process for integrating the building structure in a case where there exist no lines corresponding to any of the integration patterns, and

wherein the generating a vector operation generates a vector of the polygon line of the extracted building region estimated by the structural analysis and integration unit.

Claim 13 (Previously Presented) The computer program product according to claim 12, comprising:

analyzing colors around the at least one position to determine sample colors for discriminating, the discrimination threshold, and a region searching range;

extracting building region pixels based on a result of discriminating a similarity between a color of a roof of a building in the region searching range and the sample colors for discriminating, and

extracting a line around the extracted building region pixels as the polygon line.

Claim 14 (Previously Presented) The computer program product according to claim 12, comprising:

extracting pixels largely different in color from adjacent pixels as edge pixels, and determining boundary lines based on the edge pixels; and

expanding the extracted building region to the boundary lines to correct the extracted building region.

Claim 15 (Previously Presented) The computer program product according to claim 12, comprising:

rotating the extracted building region so as to set the polygon line of the extracted building region in a predetermined axis direction; and

smoothing the polygon line after the rotation.

Claim 16 (Previously Presented) The computer program product according to claim 12, comprising, in a case where the polygon line extracted corresponds to a predetermined linking pattern, correcting the polygon line to one of a straight line and lines crossing each other at a predetermined angle.

Claim 17 (Previously Presented) The computer program product according to claim 12, comprising:

in a case where a line of a building roof corresponds to a predetermined integration pattern, integrating the extracted building region so as to include the line; and

integrating the building region including a plurality of inputted positions.

Claim 18 (Previously Presented) The computer program product according to claim 12, comprising, in a case where the aerial photograph shows a building obliquely, correcting distortion due to a height of the building, and projecting a building polygon shape on a ground.

Claim 19 (Currently Amended) A map generation method, comprising:
receiving user appointment of at least one position in a building existing within an aerial photograph, to designate the at least one position as part of a building region;

extracting at least one pixel from pixels within the building region based on a result of discriminating a color of the pixels around the building region to compare whether the pixels are within a gray-level variance of a predetermined discrimination threshold, setting the building region to include extracted pixels as a portion of an extracted building region, and repeating the extracting and setting operations to expand the extracted building region with more extracted pixels, and then extracting a polygon line of the extracted building region;

generating a vector of the polygon line of the extracted building region; and
using a structural analysis and integration unit to detect a boundary of the building region and lines inside the building region, and to compare between a shape of detected lines and a predetermined shape pattern of cross lines;

wherein the structural analysis and integration unit estimates the building region based on the compared shape of the detected lines in a case where the lines

inside the building region correspond to any predetermined integration patterns, and
terminates a process for integrating the building structure in a case where there exist
no lines corresponding to any of the integration patterns, and
wherein the generating a vector operation generates a vector of the polygon
line of the extracted building region estimated by the structural analysis and
integration unit.

Claim 20 (Previously Presented) The map generation device according to claim 1, wherein the user appointment of the at least one position with respect to the image appointment unit is executed manually, and wherein the operations of the polygon extraction unit and the vector generation unit are executed automatically.